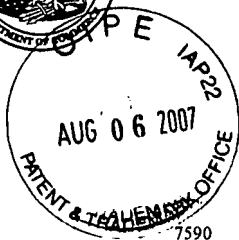




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## NOTICE OF ALLOWANCE AND FEE(S) DUE

07/27/2007

Michael G. Cameron  
Jackson Walker, LLP.  
Suite 600  
2435 North Central Expressway  
Richardson, TX 75080

EXAMINER

HIRL, JOSEPH P

ART UNIT

PAPER NUMBER

2129

DATE MAILED: 07/27/2007

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/648,855

08/26/2003

Paul Rudolf

121306.00002

8904

TITLE OF INVENTION: ASSOCIATIVE MEMORY DEVICE AND METHOD BASED ON WAVE PROPAGATION

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	\$700	\$300	\$0	\$1000	10/29/2007

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. **PROSECUTION ON THE MERITS IS CLOSED.** THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN **THREE MONTHS** FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. **THIS STATUTORY PERIOD CANNOT BE EXTENDED.** SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

## HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

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B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

**IMPORTANT REMINDER:** Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

# **PART B - FEE(S) TRANSMITTAL**

**Complete and send this form, together with applicable fee(s), to:** Mail **Mail Stop ISSUE FEE  
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**INSTRUCTIONS:** This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

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7590

07/27/2007

Michael G. Cameron  
Jackson Walker, LLP.  
Suite 600  
2435 North Central Expressway  
Richardson, TX 75080

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(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/648,855	08/26/2003	Paul Rudolf	121306.00002	8904

TITLE OF INVENTION: ASSOCIATIVE MEMORY DEVICE AND METHOD BASED ON WAVE PROPAGATION

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	\$700	\$300	\$0	\$1000	10/29/2007

EXAMINER	ART UNIT	CLASS-SUBCLASS
HIRL, JOSEPH P	2129	706-027000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.563).  
☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.  
☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a Customer Number is required.

2. For printing on the patent front page, list  
(1) the names of up to 3 registered patent attorneys or agents OR, alternatively,  
(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.  
1 \_\_\_\_\_  
2 \_\_\_\_\_  
3 \_\_\_\_\_

## 3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☐ Corporation or other private group entity ☐ Government

## 4a. The following fee(s) are submitted:

- ☐ Issue Fee  
☐ Publication Fee (No small entity discount permitted)  
☐ Advance Order - # of Copies \_\_\_\_\_

## 4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.  
☐ Payment by credit card. Form PTO-2038 is attached.  
☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number \_\_\_\_\_ (enclose an extra copy of this form).

## 5. Change in Entity Status (from status indicated above)

- ☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature \_\_\_\_\_

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This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/648,855	08/26/2003	Paul Rudolf	121306.00002	8904

7590

07/27/2007

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Richardson, TX 75080

EXAMINER
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HIRL, JOSEPH P

ART UNIT	PAPER NUMBER
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2129

DATE MAILED: 07/27/2007

## Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 531 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 531 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

**Notice of Allowability**

Application No.

10/648,855

Examiner

Joseph P. Hirl

Applicant(s)

RUDOLF, PAUL

Art Unit

2129

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to May 8, 2007.
2. ☒ The allowed claim(s) is/are 1-78.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) ☐ All b) ☐ Some\* c) ☐ None of the:
    1. ☐ Certified copies of the priority documents have been received.
    2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.


Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.  
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
  5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
    - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
    - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO/SB/08),  
Paper No./Mail Date 3/23/7
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material

5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413),  
Paper No./Mail Date \_\_\_\_\_
7. ☐ Examiner's Amendment/Comment
8. ☐ Examiner's Statement of Reasons for Allowance
9. ☐ Other \_\_\_\_\_

  
JOSEPH P. HIRL  
PRIMARY EXAMINER  
TECHNOLOGY CENTER 2100

***Examiner's Amendment/Reasons for Allowance***

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

***In the Abstract***

2. Delete all item numbers and restate the abstract as follows:

An associative, or content-addressable, memory device and method based on waves is described. In this invention, arbitrary inputs are written as patterns which are interpreted as values of complex waves, discretized or analog, on one or more buffers. Information is transported via wave propagation from the buffers to a cortex or to multiple cortices, where the patterns are associated using a mathematical operation for storage purposes or de-associated through the corresponding inverse operation for retrieval purposes. The present associative memory is shown to emulate important behavioral properties of the human brain, including higher-brain functions such as learning from experience, forming generalizations or abstractions, and autonomous operation.

***Reasons for Allowance***

3. The following are examiner's statements of reasons for allowance.
4. Regarding Inventorship and the cited prior art (Computer modeling wave propagation with a variation of the Helmholtz-Kirchoff relation, Applied Optics, Vol 29, No. 7 with authors Paul G. Rudolf, Jeffery J. Tollett and Rebecca R. McGowan), applicant's response noted on page 9 of the Appeal Brief dated May 8, 2007, applicant specifically states that "The alleged inventors are simply not inventors - the Applicant is aware of not facts that would mandate that any additional inventors be named, nor of

any claim by such persons to be inventors of the pending claimed inventions.” On the basis of such a statement, the inventor objection is withdrawn.

5. Regarding the specification objection related to the term “invertible”, one of ordinary skill in the art would understand that an invertible function is a function that can be inverted, satisfying the condition that each element in the domain corresponds to one distinct element that no other element in the domain corresponds to. Such conditions would typically allow “some invertible mathematical relation” to be determined albeit with effort and as such, the objection to the concept of “invertible” is withdrawn.

6. Regarding  $\alpha_m$ , in equation 5 of the specification, one of ordinary skill in the art would interpret such a factor to “scale the effect” and therefore the range of  $\alpha_m$  would be appropriately valued to exclude the values of plus or minus infinity. Therefore, the objection to C being undefined is withdrawn.

7. Regarding “... general and arbitrary responses to identifications.”, one of ordinary skill in the art would understand that the scope of the invention facilitates identification to a wide range of input data and as such, the related objection is withdrawn.

8. Regarding claim rejections under 35 USC §101, an associative memory device and a method of autonomous pattern recognition constitute results that are practical applications. The aspect of a “wave” or signal supports the concept of the invention but such invention is not per se a signal as disclosed. The limitations as cited for the associative memory (claims 1 and 38) and the autonomous pattern recognition (claim 74) are sufficient to overcome the preemption rejection. The concern for the value of C is addressed in ¶ 5. above.

9. Regarding the rejection of claims 1-78 under 35 USC §112, first paragraph related to §101 rejection (utility), based on the withdrawing of the 35 USC §101 utility rejections, the 35 USC §112, first paragraph, rejection related to §101 rejection (utility) is withdrawn.

10. Regarding the rejection of claims 1-78 under 35 USC §112, second paragraph, concerning the term "arbitrary," ¶ 6. above applies and this rejection under 35 USC §112, second paragraph, is withdrawn.

11. Claims 1-78 are considered allowable since when reading the claims in light of the specification, as per MPEP §2111.01, In re Sneed, 710 F.2d 1544, 1548, 218 USPQ 385 (Fed. Cir. 1983), none of the references of record alone or in combination disclose or suggest the combination of limitations specified in the independent claims.

12. Applicant cites the invention and related references to the specification in the Appeal Brief, page 6 in reference to the associative memory device of claim 1. Independent claim 38 limits to similar features of an associative memory device. Independent claim 74 limits to a method for autonomous pattern recognition using concepts similar to that of claims 1 and 38 where in desired sets of wave-modeled input data are associated through an invertible mathematical function with internal identification pattern (see specification page 82, line 12 to page 95, line 6).

13. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

***Correspondence Information***

14. Any inquiry concerning this information or related to the subject disclosure should be directed to the Primary Examiner, Joseph P. Hirl, whose telephone number is (571) 272-3685. The Examiner can be reached on Monday – Thursday from 5:30 a.m. to 4:00 p.m.

As detailed in MPEP 502.03, communications via Internet e-mail are at the discretion of the applicant. Without a written authorization by applicant recorded in the applicant's file, the USPTO will not respond via e-mail to any Internet correspondence which contains information subject to the confidentiality requirement as set forth in 35 U.S.C. 122. A paper copy of such correspondence will be placed in the appropriate patent application. The following is an example authorization which may be used by the applicant:

Notwithstanding the lack of security with Internet Communications, I hereby authorize the USPTO to communicate with me concerning any subject matter related to the instant application by e-mail. I understand that a copy of such communications related to formal submissions will be made of record in the applications file.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, David R. Vincent can be reached at (571) 272-3080.

Any response to this office action should be mailed to:

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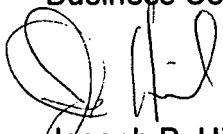
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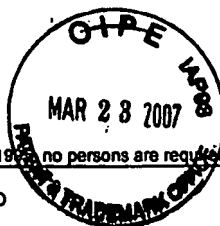
(571) 273-8300 (for formal communications intended for entry.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have any questions on access to Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll free).



Joseph P. Hirl  
Primary Examiner  
July 25, 2007

Please type a plus sign (+) inside this box



PTO/SB/08A (08-00)

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# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(use as many sheets as necessary)

## Complete If Known

Application Number	10/848,855
Filing Date	August 28, 2003
First Named Inventor	Paul Rudolf
Group Art Unit	2129
Examiner Name	Joseph P. Hirl
Attorney Docket No.	128988.00002

Sheet

1

of

1

## U.S. PATENT DOCUMENTS

Exam. Initials*	Cite No. <sup>1</sup>	U.S. Patent Document		Name of Patentee of Applicant of Cited Doc.	Date of Pub. Of Cited Doc. (mm-dd-yyyy)	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number	Kind Code <sup>2</sup> (if known)			
/JH/	AA	2002/078431		Reps	06/20/2002	
/JH/	AB	8,278,798		Rao	08/21/2001	
/JH/	AC	8,012,840		Liu	01/11/2000	
/JH/	AD	5,819,007		Elghazzawi	10/08/1998	
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## FOREIGN PATENT DOCUMENTS

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		Office <sup>3</sup>	Number <sup>4</sup>	Kind Code <sup>2</sup> (if known)				
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## OTHER PRIOR ART - NON PATENT LITERATURE DOCUMENTS

Exam. Initials*	Cite No. <sup>1</sup>	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	2
/JH/	CA	PCT International Preliminary Examination Report for Corresponding PCT Application (PCT/US03/26536), mailed February 28, 2007, 4 pgs.	
/JH/	CB	Rudolf et al., "Computer Modeling Wave Propagation With a Variation of the Helmholtz-Kirchhoff Relation," <i>APPLIED OPTICS</i> , Vol. 29, No. 7, March 1990 (Pgs. 998-1003).	
/JH/	CC	Yuasa et al., "An Autonomous Decentralized Recognition System Having a Dispersive Wave Property," <i>IEEE</i> , 1997, 0-8186-7783-X/97 (Pgs. 75-82).	
/JH/	CD	Grebienkin et al., "A Model of Wave Associative Processing," <i>IEEE</i> , 10.1109/RNNS/19922268630, October 1992 (Pgs. 870-880).	
	CE		
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\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

US and Foreign Patent Documents: <sup>1</sup>Unique citation designation number. <sup>2</sup>See attached Kinds of U.S. Patent Documents. <sup>3</sup>Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>4</sup>For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>5</sup>Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 18 if possible. <sup>6</sup>Applicant is to place a check mark here if English language Translation is attached.

Other Prior Art/Non-Patent Literature Documents: <sup>1</sup>Unique citation designation number. <sup>2</sup>Applicant is to place a check mark here if English Translation is attached.

Burden Hour Statement: This form is estimated to take 2.0 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

2887544.1

/Joseph Hirl/ (07/25/2007)

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